

**NextEra Energy Transmission New York, Inc.
(NEETNY)**

Empire State Line

Case 18-T-0499

Appendix Z

INADVERTENT RETURN PLAN

FOR

HORIZONTAL DIRECTIONAL DRILLING (HDD)

September 2020



EMPIRE STATE LINE
WETLAND MITIGATION PLAN
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ACRONYMS & ABBREVIATIONS

DPS	Department of Public Service
EM	Environmental Monitor
Empire State Line	Empire State Line
HDD	horizontal directional drilling
MSDS	Material Safety Data Sheet
NYSDEC	New York state Department of Environmental Conservation
NYSEG	New York State Energy and Gas
Plan	Inadvertent Return Plan
Project	Empire State Line Project
ROW	right-of-way

1.0 INTRODUCTION

The New York State Public Service Commission issued an “Order Granting a Certificate of Environmental Compatibility and Public Need” to NextEra Energy Transmission New York, Inc. (NEETNY) for the Empire State Line Project (Project) on June 16, 2020.

The Project includes a new approximately 20-mile 345 kilovolt (kV) transmission line and associated switchyards in the town of Royalton in Niagara County, New York, and the towns of Alden, Newstead, Lancaster, and Elma in Erie County, New York; a new 345 kV switchyard (Dysinger Switchyard) in Niagara County; and a second, new switchyard (East Stolle Switchyard) in Erie County. The approximately 20-mile 345 kV transmission line will be built on an existing utility corridor, owned by New York State Electric & Gas Corporation, and will connect the Dysinger and East Stolle Switchyards to each other. In turn, the Dysinger Switchyard will be connected to the [New York State Power Authority](#) 345 kV Niagara lines via two double circuit structures approximately 0.30 miles in length and the NYSEG 345 kV Kintigh lines via two single circuit structures approximately 0.15 miles in length (Dysinger Tie-Ins). Likewise, the East Stolle Switchyard will be connected to the NYSEG Stolle Road Substation via single circuit structures approximately 0.2 miles in length and NYSEG 345 kV Stolle Road to Homer City transmission line via single circuit structures approximately 0.2 miles in length (“East Stolle Tie-Ins”). The Project has a required in-service date of June 1, 2022.

NEETNY is proposing to utilize trenchless excavation techniques, otherwise known as horizontal directional drilling (HDD), on the Project to route the 345-kilovolt transmission beneath the New York State Thruway within the existing New York State Energy and Gas (NYSEG) company transmission lines right-of-way (ROW) (see Attachment A to this Appendix). The HDD method is a proven, safe and efficient method of crossing roads, railroads, streams, wetlands, and other environmentally sensitive areas with minimal surface impact. The HDD alignment across Interstate 90 is shown on the figure in Attachment B to this Appendix. The HDD plan and profile drawings are provided in Appendix A of the Environmental Management and Construction Plan).

The HDD process involves the use of water and bentonite (a naturally occurring clay) slurry as a coolant and lubricant for the advancing drill head. The slurry also helps to stabilize the bore and aids in the removal of cuttings during the drilling process. Bentonite is nontoxic; however, if released into waterbodies, has the potential to adversely impact fish, fish eggs, aquatic plants, and benthic invertebrates. Therefore, to protect these natural resources, NEETNY has prepared this Inadvertent Return Plan (Plan) that outlines operational procedures and responsibilities for the prevention, containment, and cleanup of inadvertent releases associated with the HDD process. A Halliburton Bentonite Material Safety Data Sheet (MSDS) is attached in Attachment C to this

Appendix. The final Bentonite/ fluids material products will be selected by the HDD contractor and this Plan will be updated to include this information.

The objective of this Plan is to:

1. Minimize the potential for an inadvertent release of drilling fluids associated with HDD activities;
2. Provide for the timely detection of inadvertent returns;
3. Protect environmentally sensitive areas (wetlands) and the New York State Thruway while responding to an inadvertent release;
4. Ensure an organized, timely, and “minimum-impact” response in the event of an inadvertent return and release of drilling fluids; and
5. Ensure that all appropriate notifications are made immediately.

2.0 SITE PERSONNEL RESPONSIBILITIES

The HDD Contractor will be responsible for execution of HDD operations, including actions for detecting and controlling inadvertent releases of drilling fluids. The HDD Contractor is also responsible for understanding the contents of this Plan and ensuring that the appropriate personnel are identified and familiar with its contents and the procedures for cleanup of an inadvertent release.

The Project Construction Supervisor will have overall responsibility for implementing the Plan and will be familiar with all aspects of the drilling activity, the contents of this Plan, and the conditions of approval under which the activity is permitted to take place. The Project Construction Supervisor will ensure that a copy of this Plan is available on-site and accessible to all construction personnel during HDD activities. The Project Construction Supervisor will provide the anticipated schedule of HDD operations to the Environmental Monitor (EM) responsible for environmental compliance monitoring prior to the commencement of work. The Project Construction Supervisor will also be supported by Environmental Services Construction Environmental Compliance Team, a NextEra Energy Inc. shared service, who will be also monitoring the HDD work effort to ensure all construction aspects will be in compliance.

The EM will closely supervise the progress and actions of the HDD Contractor. The EM will be on-site and available during HDD operations to consult with HDD personnel and conduct inspections. The Construction Supervisor will promptly notify the EM when an inadvertent release is suspected or detected. The EM will have the authority to stop work, evaluate the situation, and determine the appropriate measures necessary to address an inadvertent release. The EM will be responsible for notifying the appropriate regulatory agencies.

2.1 Training

Prior to the start of construction, the HDD Construction Supervisor and EM will ensure that the crew members receive and understand the following:

- Provisions of this Plan;
- Site-specific permit and monitoring requirements;
- Locations of sensitive environmental resources at the HDD site;
- Procedures for inadvertent release prevention;
- Location and proper use of containment equipment and materials;

- Contractor/crew member obligation to immediately suspend drilling operations upon evidence of an inadvertent release;
- Requirement to immediately report any inadvertent releases to the Construction Supervisor and EM;
- Contractor/crew member responsibilities in the event of an inadvertent release; and
- Protocols for reporting observed releases and communication with appropriate regulatory agencies.

3.0 MEASURES TO PREVENT INADVERTENT RELEASE

Although HDD has proven to be a safe and reliable method of crossing surface features with very minimal impact, the potential still exists for inadvertent releases of drilling fluid to the surface, which can have a detrimental impact on the environment. These releases typically occur as a result of seeps that can form when pressure in the drill hole exceeds the capability of the overburden to contain it, or when fluids find a preexisting fault in the overburden. The likelihood of these situations occurring can be minimized by taking into consideration the soil type and bedrock composition. Bore depth should be determined based on these site-specific factors; however, a minimum depth of 25 feet in sound soils is typically sufficient to prevent an inadvertent release.

Increased pressures in the drill hole can also be the result of excessively tight turns. The potential for increased pressures can be reduced simply by increasing the radius of bends in the profile.

A loss of drilling pressure is the most obvious indication of a seep; therefore, drilling pressure shall be monitored continuously for any loss of pressure that might indicate the presence of a seep.

Exit and entry pits will be enclosed by filter sock and straw bales and any other needed best management practices. Barriers (straw bales or sedimentation fences) between the bore site and the edge of sensitive environmental resources will be constructed prior to drilling to prevent released drilling fluid from reaching them.

The Project Construction Supervisor will ensure a corridor centered on the drill path will be continuously monitored for any signs of inadvertent release. In addition, when crossing a wetland, the wetland area will be continuously monitored for signs of an inadvertent release.

Water containing mud, silt, bentonite or other materials from equipment washing or other activities, will not be allowed to enter a wetland or waterbody. The bentonite used in the drilling process will either be recycled or disposed of at an approved facility.

3.1 Equipment and Containment Materials

The Project Construction Supervisor will ensure that:

- All equipment and vehicles are checked and maintained daily to prevent leaks of hazardous materials;
- Spill kits and spill containment materials are available on-site at all times and that the equipment is in good working order;

- Equipment required to contain and clean up an inadvertent release will either be available at the work site or readily available at an off-site location within 10 minutes of the drill site; and
- If equipment is required to be operated near a wetland, absorbent pads, and plastic sheeting for placement beneath motorized equipment will be used to protect the wetland from engine fluids.

At a minimum, the following containment, response, and cleanup equipment will be available at the HDD crossing location at the time such crossing occurs and will be readily available for use in the event of an accidental release of drilling fluids:

- Spill kit;
- Straw bales;
- Filter sock;
- Plastic sheeting;
- Turbidity barriers;
- Sand bags;
- Shovels;
- Buckets;
- Push brooms;
- Squeegees;
- Pumps and suction hose;
- Discharge hose;
- Storage tanks;
- Communications equipment; and
- Vacuum truck on 24-hour call.

The Preliminary HDD transmission line route depicts the proposed HDD locations and is included as Attachment B of this plan.

4.0 RESPONSE TO AN INADVERTENT RELEASE

The Project Construction Supervisor will be on-site prior to beginning, and during, any HDD activities. The Project Construction Supervisor will have a tailgate briefing at the beginning of each day of drilling to review appropriate procedures in the case of an inadvertent return. During the briefing, drilling crew or other Project staff questions and concerns will be addressed. The tailgate briefings will be documented and stored in Project files.

Once the drill rig is in place and HDD begins, the drill operator will immediately stop work whenever the pressure in the drill rig drops, there is a lack of returns in the entrance pit, or other evidence of an inadvertent release occurs. Upon evidence of an inadvertent release, the drill operator will immediately pull back the drill head to relieve pressure on the system.

If an inadvertent release is suspected, the Project Construction Supervisor and EM will be notified immediately to ensure appropriate response actions are taken and notifications are made. The Project Construction Supervisor and EM will conduct an evaluation of the situation.

If no inadvertent release is detected, the drill operator will attempt to re-establish returns through standard HDD practice and continue HDD activity.

If an inadvertent release is detected, the Project Construction Supervisor and EM will:

1. Cease all drilling activities.
2. Make appropriate initial notifications – see “Notifications” below. Notification of New York State Department of Public Service (DPS), New York State Thruway Authority and Region 9 of the New York state Department of Environmental Conservation (NYSDEC) respective staffs if off Project Area access is needed to clean up an inadvertent release.
3. Establish a safety zone to protect cleanup workers from New York State Thruway traffic.
4. Implement containment measures to minimize the affected area.
 - a. In upland or relatively dry wetland areas, containment techniques may include installation of earthen dams/ditches, or placement of sand bags or silt fence barriers to stem flow.
 - b. In a flowing swale or stream, several techniques may be implemented including turbidity curtains, sandbags placed on the bottom of the stream to slow flow, pumping water from above the inadvertent release to below the inadvertent release, or others which minimize or stop materials from flowing farther downstream.

- c. In wetlands, the EM and Construction Supervisor will direct containment of material consistent with the methods described above. In some cases, however, equipment and personnel activities associated with containment and recovery of the bentonite slurry may be deemed likely to cause more damage to the ecosystem. Under such circumstances, mitigation efforts may be suspended at the EM's discretion.
5. If the volume of a release is too small to be practically collected, it may be allowed to dry and dissipate naturally.
6. If the volume of a release is small and it is practical to do so, it can be collected by hand with shovels and soft bristled brooms. The area should be scraped down to bare soil without unnecessarily disturbing exiting vegetation.
7. If the volume of a release is large, a vacuum truck or diaphragm mud pump shall be utilized.
8. Bentonite slurry, whether collected by hand or mechanical means, shall be directed into buckets, tanks, a vacuum truck, or other containment device and stored outside of sensitive environmental areas and recycled or disposed of in an approved manner.

4.1 Notifications

The EM will be responsible for notifying DPS, New York State Thruway Authority, and NYSDEC staff, if practicable, within 2 hours of an inadvertent release to a state regulated wetland or protected stream.

Table 1 Contact Information

Agency	Contact	Address and Telephone Number
New York State Department of Public Service (DPS)	Andrew Fecco	3 Empire Plaza Albany, NY 12223-1350 (315) 200-0162
New York State Thruway Authority Buffalo Division Headquarters		(716) 631-9017
New York State Department of Environmental Conservation (NYSDEC)	Region 9 Permits	270 Michigan Avenue Buffalo, NY 14203-2999 (716) 851-7050
	NYS Spills Hotline	625 Broadway, 11 th Floor Albany, New York 12233 (1-800-457-7362)

Information to be documented shall include:

1. Name of the Project;
2. Date/Time of loss of return;
3. Date/Time of discovery of any drilling material to the surface of the ground;
4. Person who made the first discovery;
5. Physical location of release;
6. If release is in an upland area, stream, or wetland;
7. Estimated volume of material released;
8. Containment activity;
9. Cleanup activity; and
10. Estimated cleanup duration.

The EM is responsible for a log and filing of all information pertaining to the event including names, times, contacts, and start and completion of remediation activities.

5.0 CLEANUP AND RESTORATION

Site-specific cleanup and restoration measures will be developed by the Project Construction Supervisor and the EM in consultation with DPS and NYSDEC staff as practicable. However, the following measures are considered appropriate:

- The Project Construction Supervisor will be responsible for ensuring that the recovered drilling fluid is either recycled or disposed of at an approved facility. No recovered drilling fluids will be discharged into wetlands, streams, storm drains, or any other water source.
- All emergency excavation and cleanup sites will be returned to natural contours as necessary using clean fill.
- All containment measures (e.g., straw bales and turbidity barriers) will be removed, unless otherwise specified by the Construction Supervisor.
- The EM will notify and coordinate any necessary follow-up response with agency representatives.

5.1 Construction Restart

The Project Construction Supervisor and EM will agree on plans moving forward. Options may include the industry standard practice of lower pressure/flow, changing viscosity of the slurry, using additives consistent with the geology, “pushing through” if the volume of inadvertent release is manageable and not impacting a stream or wetland, abandonment and relocation of the entry, or changing the drill path.

5.2 Documentation

Inadvertent releases will be recorded in the Project daily log and Project files by the EM. The log will include the following:

- An estimate of the amount of drilling fluid released;
- Location and time of the release;
- Size of the area impacted;
- Notifications made;
- Summary of the response; and
- Success of the cleanup action.

ATTACHMENT A THRUWAY CROSSING AREA AERIAL PHOTO (OCTOBER 15, 2019) – VIEW TO SOUTH



ATTACHMENT B HDD ALIGNMENT ACROSS INTERSTATE 90



**ATTACHMENT C MATERIAL SAFETY DATA SHEET – HALLIBURTON
BENTONITE - EXAMPLE**

HALLIBURTON**SAFETY DATA SHEET****Product Trade Name: BENTONITE****Revision Date:** 15-Mar-2016**Revision Number:** 38**1. Identification****1.1. Product Identifier**

Product Trade Name: BENTONITE
Synonyms None
Chemical Family: Mineral
Internal ID Code HM000126

1.2 Recommended use and restrictions on use

Application: Weight Additive
Uses advised against No information available

1.3 Manufacturer's Name and Contact Details**Manufacturer/Supplier**

Halliburton Energy Services, Inc.
P.O. Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone: (1-866-519-4752 (US, Canada, Mexico) or 1-760-476-3962

Halliburton Energy Services
645 - 7th Ave SW Suite 2200
Calgary, AB
T2P 4G8
Canada

Prepared By

Chemical Stewardship
Telephone: 1-281-871-6107
e-mail: fdunexchem@halliburton.com

1.4. Emergency telephone number

Emergency Telephone Number 1-866-519-4752 or 1-760-476-3962

2. Hazard(s) Identification**2.1 Classification in accordance with paragraph (d) of §1910.1200**

Carcinogenicity	Category 1A - H350
Specific Target Organ Toxicity - (Repeated Exposure)	Category 1 - H372

2.2. Label Elements**Hazard pictograms**

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Signal Word	Danger
Hazard Statements	H350 - May cause cancer H372 - Causes damage to organs through prolonged or repeated exposure
Precautionary Statements	
Prevention	P201 - Obtain special instructions before use P202 - Do not handle until all safety precautions have been read and understood P260 - Do not breathe dust/fume/gas/mist/vapors/spray P264 - Wash face, hands and any exposed skin thoroughly after handling P270 - Do not eat, drink or smoke when using this product P280 - Wear protective gloves/protective clothing/eye protection/face protection
Response	P308 + P313 - IF exposed or concerned: Get medical advice/attention P314 - Get medical attention/advice if you feel unwell
Storage	P405 - Store locked up
Disposal	P501 - Dispose of contents/container in accordance with local/regional/national/international regulations

2.3 Hazards not otherwise classified

None known

3. Composition/information on Ingredients

Substances	CAS Number	PERCENT (w/w)	GHS Classification - US
Crystalline silica, quartz	14808-60-7	1 - 5%	Carc. 1A (H350) STOT RE 1 (H372)
Crystalline silica, cristobalite	14464-46-1	0.1 - 1%	Carc. 1A (H350) STOT RE 1 (H372)
Crystalline silica, tridymite	15468-32-3	0.1 - 1%	Carc. 1A (H350) STOT RE 1 (H372)

The exact percentage (concentration) of the composition has been withheld as proprietary.

4. First-Aid Measures**4.1. Description of first aid measures**

Inhalation	If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.
Eyes	In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.
Skin	Wash with soap and water. Get medical attention if irritation persists.
Ingestion	Under normal conditions, first aid procedures are not required.

4.2 Most important symptoms/effects, acute and delayed

Breathing crystalline silica can cause lung disease, including silicosis and lung cancer. Crystalline silica has also been associated with scleroderma and kidney disease.

4.3. Indication of any immediate medical attention and special treatment needed

Notes to Physician Treat symptomatically.

5. Fire-fighting measures**5.1. Extinguishing media**

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Suitable Extinguishing Media

All standard fire fighting media

Extinguishing media which must not be used for safety reasons

None known.

5.2 Specific hazards arising from the substance or mixture**Special exposure hazards in a fire**

None anticipated

5.3 Special protective equipment and precautions for fire-fighters**Special protective equipment for firefighters**

Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

6. Accidental release measures**6.1. Personal precautions, protective equipment and emergency procedures**

Use appropriate protective equipment. Avoid creating and breathing dust.

See Section 8 for additional information

6.2. Environmental precautions

None known.

6.3. Methods and material for containment and cleaning up

Collect using dustless method and hold for appropriate disposal. Consider possible toxic or fire hazards associated with contaminating substances and use appropriate methods for collection, storage and disposal.

7. Handling and storage**7.1. Precautions for safe handling****Handling Precautions**

This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposure below recommended exposure limits. Wear a NIOSH certified, European Standard En 149, or equivalent respirator when using this product. Material is slippery when wet.

Hygiene Measures

Handle in accordance with good industrial hygiene and safety practice.

7.2. Conditions for safe storage, including any incompatibilities**Storage Information**

Use good housekeeping in storage and work areas to prevent accumulation of dust. Close container when not in use. Do not reuse empty container.

8. Exposure Controls/Personal Protection**8.1 Occupational Exposure Limits**

Substances	CAS Number	OSHA PEL-TWA	ACGIH TLV-TWA
Crystalline silica, quartz	14808-60-7	TWA: 10 mg/m ³ %SiO ₂ + 2	TWA: 0.025 mg/m ³
Crystalline silica, cristobalite	14464-46-1	TWA: 1/2 x 10 mg/m ³ %SiO ₂ + 2	TWA: 0.025 mg/m ³
Crystalline silica, tridymite	15468-32-3	TWA: 1/2 x 10 mg/m ³ %SiO ₂ + 2	TWA: 0.05 mg/m ³

8.2 Appropriate engineering controls

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Engineering Controls Use approved industrial ventilation and local exhaust as required to maintain exposures below applicable exposure limits.

8.3 Individual protection measures, such as personal protective equipment

Personal Protective Equipment If engineering controls and work practices cannot prevent excessive exposures, the selection and proper use of personal protective equipment should be determined by an industrial hygienist or other qualified professional based on the specific application of this product.

Respiratory Protection Wear a NIOSH certified, European Standard EN 149 (FFP2/FFP3), AS/NZS 1715, or equivalent respirator when using this product.

Hand Protection Normal work gloves.

Skin Protection Wear clothing appropriate for the work environment. Dusty clothing should be laundered before reuse. Use precautionary measures to avoid creating dust when removing or laundering clothing.

Eye Protection Wear safety glasses or goggles to protect against exposure.

Other Precautions None known.

9. Physical and Chemical Properties**9.1. Information on basic physical and chemical properties**

Physical State: Solid	Color	Various
Odor: Odorless	Odor	No information available
	Threshold:	

<u>Property</u>	<u>Values</u>
<u>Remarks/ - Method</u>	
pH:	9.9
Freezing Point / Range	No data available
Melting Point / Range	No data available
Boiling Point / Range	No data available
Flash Point	No data available
Flammability (solid, gas)	No data available
Upper flammability limit	No data available
Lower flammability limit	No data available
Evaporation rate	No data available
Vapor Pressure	No data available
Vapor Density	No data available
Specific Gravity	2.65
Water Solubility	Insoluble in water
Solubility in other solvents	No data available
Partition coefficient: n-octanol/water	No data available
Autoignition Temperature	No data available
Decomposition Temperature	No data available
Viscosity	No data available
Explosive Properties	No information available
Oxidizing Properties	No information available

9.2. Other information

VOC Content (%) No data available

10. Stability and Reactivity**10.1. Reactivity**

Not expected to be reactive.

10.2. Chemical stability

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Stable

10.3. Possibility of hazardous reactions

Will Not Occur

10.4. Conditions to avoid

None anticipated

10.5. Incompatible materials

Hydrofluoric acid.

10.6. Hazardous decomposition products

Amorphous silica may transform at elevated temperatures to tridymite (870 C) or cristobalite (1470 C).

11. Toxicological Information**11.1 Information on likely routes of exposure****Principle Route of Exposure** Eye or skin contact, inhalation.**11.2 Symptoms related to the physical, chemical and toxicological characteristics****Acute Toxicity****Inhalation**

Inhaled crystalline silica in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (IARC, Group 1). There is sufficient evidence in experimental animals for the carcinogenicity of tridymite (IARC, Group 2A).

Breathing silica dust may cause irritation of the nose, throat, and respiratory passages. Breathing silica dust may not cause noticeable injury or illness even though permanent lung damage may be occurring. Inhalation of dust may also have serious chronic health effects (See "Chronic Effects/Carcinogenicity" subsection below).

Eye Contact

May cause mechanical irritation to eye.

Skin Contact

None known.

Ingestion

None known.

Chronic Effects/Carcinogenicity

Silicosis: Excessive inhalation of respirable crystalline silica dust may cause a progressive, disabling, and sometimes-fatal lung disease called silicosis. Symptoms include cough, shortness of breath, wheezing, non-specific chest illness, and reduced pulmonary function. This disease is exacerbated by smoking. Individuals with silicosis are predisposed to develop tuberculosis.

Cancer Status: The International Agency for Research on Cancer (IARC) has determined that crystalline silica inhaled in the form of quartz or cristobalite from occupational sources can cause lung cancer in humans (Group 1 - carcinogenic to humans) and has determined that there is sufficient evidence in experimental animals for the carcinogenicity of tridymite (Group 2A - possible carcinogen to humans). Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997) in conjunction with the use of these minerals. The National Toxicology Program classifies respirable crystalline silica as "Known to be a human carcinogen". Refer to the 9th Report on Carcinogens (2000). The American Conference of Governmental Industrial Hygienists (ACGIH) classifies crystalline silica, quartz, as a suspected human carcinogen (A2). There is some evidence that breathing respirable crystalline silica or the disease silicosis is associated with an increased incidence of significant disease endpoints such as scleroderma (an immune system disorder manifested by scarring of the lungs, skin, and other

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internal organs) and kidney disease.

11.3 Toxicity data**Toxicology data for the components**

Substances	CAS Number	LD50 Oral	LD50 Dermal	LC50 Inhalation
Crystalline silica, quartz	14808-60-7	> 15000 mg/kg (human)	No information available	No data available
Crystalline silica, cristobalite	14464-46-1	>15,000 mg/kg (Human)	No data available	No data available
Crystalline silica, tridymite	15468-32-3	>15,000 mg/kg (Human)	No data available	No data available

Substances	CAS Number	Skin corrosion/irritation
Crystalline silica, quartz	14808-60-7	Non-irritating to the skin
Crystalline silica, cristobalite	14464-46-1	Non-irritating to the skin
Crystalline silica, tridymite	15468-32-3	Non-irritating to the skin

Substances	CAS Number	Serious eye damage/irritation
Crystalline silica, quartz	14808-60-7	Mechanical irritation of the eyes is possible. No information available
Crystalline silica, cristobalite	14464-46-1	Mechanical irritation of the eyes is possible.
Crystalline silica, tridymite	15468-32-3	Mechanical irritation of the eyes is possible.

Substances	CAS Number	Skin Sensitization
Crystalline silica, quartz	14808-60-7	No information available.
Crystalline silica, cristobalite	14464-46-1	No information available
Crystalline silica, tridymite	15468-32-3	No information available

Substances	CAS Number	Respiratory Sensitization
Crystalline silica, quartz	14808-60-7	No information available
Crystalline silica, cristobalite	14464-46-1	No information available
Crystalline silica, tridymite	15468-32-3	No information available

Substances	CAS Number	Mutagenic Effects
Crystalline silica, quartz	14808-60-7	Not regarded as mutagenic.
Crystalline silica, cristobalite	14464-46-1	Not regarded as mutagenic.
Crystalline silica, tridymite	15468-32-3	Not regarded as mutagenic.

Substances	CAS Number	Carcinogenic Effects
Crystalline silica, quartz	14808-60-7	Contains crystalline silica which may cause silicosis, a delayed and progressive lung disease. The IARC and NTP have determined there is sufficient evidence in humans of the carcinogenicity of crystalline silica with repeated respiratory exposure. Based on available scientific evidence, this substance is a threshold carcinogen with a mode of action involving indirect genotoxicity secondary to lung injury.
Crystalline silica, cristobalite	14464-46-1	Contains crystalline silica which may cause silicosis, a delayed and progressive lung disease. The IARC and NTP have determined there is sufficient evidence in humans of the carcinogenicity of crystalline silica with repeated respiratory exposure. Based on available scientific evidence, this substance is a threshold carcinogen with a mode of action involving indirect genotoxicity secondary to lung injury.
Crystalline silica, tridymite	15468-32-3	Contains crystalline silica which may cause silicosis, a delayed and progressive lung disease. The IARC and NTP have determined there is sufficient evidence in humans of the carcinogenicity of crystalline silica with repeated respiratory exposure. Based on available scientific evidence, this substance is a threshold carcinogen with a mode of action involving indirect genotoxicity secondary to lung injury.

Substances	CAS Number	Reproductive toxicity
Crystalline silica, quartz	14808-60-7	No information available
Crystalline silica, cristobalite	14464-46-1	No information available
Crystalline silica, tridymite	15468-32-3	No information available

Substances	CAS Number	STOT - single exposure
Crystalline silica, quartz	14808-60-7	No significant toxicity observed in animal studies at concentration requiring classification.
Crystalline silica, cristobalite	14464-46-1	No significant toxicity observed in animal studies at concentration requiring classification.
Crystalline silica, tridymite	15468-32-3	No significant toxicity observed in animal studies at concentration requiring classification.

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Substances	CAS Number	STOT - repeated exposure
Crystalline silica, quartz	14808-60-7	Causes damage to organs through prolonged or repeated exposure if inhaled: (Lungs)
Crystalline silica, cristobalite	14464-46-1	Causes damage to organs through prolonged or repeated exposure if inhaled: (Lungs)
Crystalline silica, tridymite	15468-32-3	Causes damage to organs through prolonged or repeated exposure if inhaled: (Lungs)

Substances	CAS Number	Aspiration hazard
Crystalline silica, quartz	14808-60-7	Not applicable
Crystalline silica, cristobalite	14464-46-1	Not applicable
Crystalline silica, tridymite	15468-32-3	Not applicable

12. Ecological Information**12.1. Toxicity****Ecotoxicity effects**

Product is not classified as hazardous to the environment.

Product Ecotoxicity Data

No data available

Substance Ecotoxicity Data

Substances	CAS Number	Toxicity to Algae	Toxicity to Fish	Toxicity to Microorganisms	Toxicity to Invertebrates
Crystalline silica, quartz	14808-60-7	EC50 (72 h) =440 mg/L (Selenastrum capricornutum)	LL0 (96 h) =10000 mg/L (Danio rerio)	No information available	LL50 (24 h) >10000 mg/L (Daphnia magna)
Crystalline silica, cristobalite	14464-46-1	No information available	LL0 (96h) 10,000 mg/L (Danio rerio) (similar substance)	No information available	LL50 (24h) > 10,000 mg/L (Daphnia magna) (similar substance)
Crystalline silica, tridymite	15468-32-3	No information available	LL0 (96h) 10,000 mg/L (Danio rerio) (similar substance)	No information available	LL50 (24h) > 10,000 mg/L (Daphnia magna) (similar substance)

12.2. Persistence and degradability

Substances	CAS Number	Persistence and Degradability
Crystalline silica, quartz	14808-60-7	The methods for determining biodegradability are not applicable to inorganic substances.
Crystalline silica, cristobalite	14464-46-1	The methods for determining biodegradability are not applicable to inorganic substances.
Crystalline silica, tridymite	15468-32-3	The methods for determining biodegradability are not applicable to inorganic substances.

12.3. Bioaccumulative potential

Substances	CAS Number	Log Pow
Crystalline silica, quartz	14808-60-7	No information available
Crystalline silica, cristobalite	14464-46-1	No information available
Crystalline silica, tridymite	15468-32-3	No information available

12.4. Mobility in soil

Substances	CAS Number	Mobility
Crystalline silica, quartz	14808-60-7	No information available
Crystalline silica, cristobalite	14464-46-1	No information available
Crystalline silica, tridymite	15468-32-3	No information available

12.5 Other adverse effects

No information available

13. Disposal Considerations

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13.1. Waste treatment methods**Disposal methods**

Bury in a licensed landfill according to federal, state, and local regulations. Substance should NOT be deposited into a sewage facility.

Contaminated Packaging

Follow all applicable national or local regulations. Contaminated packaging may be disposed of by: rendering packaging incapable of containing any substance, or treating packaging to remove residual contents, or treating packaging to make sure the residual contents are no longer hazardous, or by disposing of packaging into commercial waste collection.

14. Transport Information**US DOT**

UN Number	Not restricted
UN proper shipping name	Not restricted
Transport Hazard Class(es)	Not applicable
Packing Group:	Not applicable
Environmental Hazards	Not applicable

Canadian TDG

UN Number	Not restricted
UN proper shipping name	Not restricted
Transport Hazard Class(es)	Not applicable
Packing Group:	Not applicable
Environmental Hazards	Not applicable

IMDG/IMO

UN Number	Not restricted
UN proper shipping name	Not restricted
Transport Hazard Class(es)	Not applicable
Packing Group:	Not applicable
Environmental Hazards	Not applicable

IATA/ICAO

UN Number	Not restricted
UN proper shipping name	Not restricted
Transport Hazard Class(es)	Not applicable
Packing Group:	Not applicable
Environmental Hazards	Not applicable

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not applicable

Special Precautions for User None

15. Regulatory Information**US Regulations****US TSCA Inventory**

All components listed on inventory or are exempt.

TSCA Significant New Use Rules - S5A2

Substances	CAS Number	TSCA Significant New Use Rules - S5A2
Crystalline silica, quartz	14808-60-7	Not applicable
Crystalline silica, cristobalite	14464-46-1	Not applicable
Crystalline silica, tridymite	15468-32-3	Not applicable

EPA SARA Title III Extremely Hazardous Substances

Substances	CAS Number	EPA SARA Title III Extremely Hazardous
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		Substances
Crystalline silica, quartz	14808-60-7	Not applicable
Crystalline silica, cristobalite	14464-46-1	Not applicable
Crystalline silica, tridymite	15468-32-3	Not applicable

EPA SARA (311,312) Hazard Class

Chronic Health Hazard

EPA SARA (313) Chemicals

Substances	CAS Number	Toxic Release Inventory (TRI) - Group I	Toxic Release Inventory (TRI) - Group II
Crystalline silica, quartz	14808-60-7	Not applicable	Not applicable
Crystalline silica, cristobalite	14464-46-1	Not applicable	Not applicable
Crystalline silica, tridymite	15468-32-3	Not applicable	Not applicable

EPA CERCLA/Superfund Reportable Spill Quantity

Substances	CAS Number	CERCLA RQ
Crystalline silica, quartz	14808-60-7	Not applicable
Crystalline silica, cristobalite	14464-46-1	Not applicable
Crystalline silica, tridymite	15468-32-3	Not applicable

EPA RCRA Hazardous Waste Classification

If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.

California Proposition 65

The California Proposition 65 regulations apply to this product.

MA Right-to-Know Law

One or more components listed.

NJ Right-to-Know Law

One or more components listed.

PA Right-to-Know Law

One or more components listed.

NFPA Ratings:

Health 0, Flammability 0, Reactivity 0

HMIS Ratings:

Health 0*, Flammability 0, Physical Hazard 0, PPE: E

Canadian Regulations

Canadian Domestic Substances List (DSL) All components listed on inventory or are exempt.

16. Other information**Preparation Information**

Prepared By Chemical Stewardship
Telephone: 1-281-871-6107
e-mail: fdunexchem@halliburton.com

Revision Date: 15-Mar-2016

Reason for Revision SDS sections updated:
2

Additional information

For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Safety Data Sheet for this or other Halliburton products, contact Chemical Stewardship at 1-580-251-4335.

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Key or legend to abbreviations and acronyms used in the safety data sheet

bw – body weight
CAS – Chemical Abstracts Service
EC50 – Effective Concentration 50%
ErC50 – Effective Concentration growth rate 50%
LC50 – Lethal Concentration 50%
LD50 – Lethal Dose 50%
LL50 – Lethal Loading 50%
mg/kg – milligram/kilogram
mg/L – milligram/liter
NIOSH – National Institute for Occupational Safety and Health
NTP – National Toxicology Program
OEL – Occupational Exposure Limit
PEL – Permissible Exposure Limit
ppm – parts per million
STEL – Short Term Exposure Limit
TWA – Time-Weighted Average
UN – United Nations
h - hour
mg/m³ - milligram/cubic meter
mm - millimeter
mmHg - millimeter mercury
w/w - weight/weight
d - day

Key literature references and sources for data

www.ChemADVISOR.com/
NZ CCID

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End of Safety Data Sheet